

What is claimed is:

1 1. A method for processing digital images received in the form of
2 compressed video streams comprising the step of (a) determining a region intensity
3 histogram (RIH) based on information on motion compensation of inter frames.

1 2. The digital video processing method according to claim 1, before the
2 step (a), further comprising the steps of:
3 (p-a) receiving video streams;
4 (p-b) grouping the video streams into a plurality of groups using a
5 predetermined algorithm;
6 (p-c) selecting a group to be processed,
7 wherein in the step (a), the RIH of the selected group is determined based on
8 information on motion compensation of inter frames.

1 3. A method for processing digital images received in the form of
2 compressed video streams comprising the step of:
3 (a) selecting an inter frame from the video streams;
4 (b) with respect to the selected inter frame, calculating the ratio of the number
5 of blocks whose motion compensation values are zero to the total number of
6 macroblocks;
7 (c) quantizing the ratio into i levels, where i is a predetermined positive
8 number;
9 (d) checking whether the processed inter frame is the last one;
10 (e) if it is determined in the step (d) that the processed inter frame is not the
11 last one, selecting the next inter frame and performing the steps (b) through (d);
12 (f) if it is determined in the step (d) that the processed inter frame is the last
13 one, calculating the ratio of the number of inter frames in the i th level to the total
14 number of inter frames in a given region; and
15 (g) determining the ratio obtained in the step (f) as predetermined histogram
16 information.

1 4. The digital video processing method according to claim 3, further
2 comprising the steps of:
3 (p-a) receiving video streams;
4 (p-b) grouping the video streams into a plurality of groups using a
5 predetermined algorithm;
6 (p-c) selecting a group to be processed,
7 wherein in the step (a), an inter frame is selected from the video stream group
8 selected in the step (p-c).

1 5. The digital video processing method according to claim 4, after the
2 step (g), further comprising the steps of:
3 (h) checking whether the selected group is the last one;
4 (i) if it is determined in the step (h) that the selected group is not the last one,
5 selecting the next group; and
6 (j) performing the steps (a) through (h) with respect to the next group selected
7 in the step (i).

1 6. The digital video processing method according to claim 4, wherein the
2 predetermined algorithm is a scene cut detection algorithm.

1 7. The digital video processing method according to claim 5, wherein the
2 predetermined algorithm is a scene cut detection algorithm.

1 8. The digital video processing method according to claim 4, wherein the
2 video streams are moving picture expert group (MPEG)-7 video streams.

1 9. The digital video processing method according to claim 5, wherein the
2 video streams are moving picture expert group (MPEG)-7 video streams.

1 10. The digital video processing method according to claim 6, wherein the
2 video streams are moving picture expert group (MPEG)-7 video streams.

1 11. The digital video processing method according to claim 7, wherein the
2 video streams are moving picture expert group (MPEG)-7 video streams.

1 12. The digital video processing method according to claim 3, wherein the
2 predetermined histogram information is defined by a region intensity histogram (RIH)
3 which indicates the intensity of a given video scene region.

1 13. The digital video processing method according to claim 4, wherein the
2 predetermined histogram information is defined by a region intensity histogram (RIH)
3 which indicates the intensity of a given video scene region.

1 14. The digital video processing method according to claim 5, wherein the
2 predetermined histogram information is defined by a region intensity histogram (RIH)
3 which indicates the intensity of a given video scene region.

1 15. The digital video processing method according to claim 6, wherein the
2 predetermined histogram information is defined by a region intensity histogram (RIH)
3 which indicates the intensity of a given video scene region.

1 16. The digital video processing method according to claim 7, wherein the
2 predetermined histogram information is defined by a region intensity histogram (RIH)
3 which indicates the intensity of a given video scene region.

1 17. The digital video processing method according to claim 8, wherein the
2 predetermined histogram information is defined by a region intensity histogram (RIH)
3 which indicates the intensity of a given video scene region.

1 18. The digital video processing method according to claim 9, wherein the
2 predetermined histogram information is defined by a region intensity histogram (RIH)
3 which indicates the intensity of a given video scene region.

1 19. The digital video processing method according to claim 10, wherein the
2 predetermined histogram information is defined by a region intensity histogram (RIH)
3 which indicates the intensity of a given video scene region.

1 20. The digital video processing method according to claim 11, wherein the
2 predetermined histogram information is defined by a region intensity histogram (RIH)
3 which indicates the intensity of a given video scene region.

1 21. A digital video processing method comprising the step of defining the
2 distribution of blocks whose motion compensation values are zero as motion activity,
3 with respect to inter frames.

1 22. A computer readable medium having program codes executable by a
2 computer to perform a digital video processing method comprising the steps of:

- 3 (a) selecting an inter frame from the video streams;
4 (b) with respect to the selected inter frame, calculating the ratio of the number
5 of blocks whose motion compensation values are zero to the total number of
6 macroblocks;
7 (c) quantizing the ratio into i levels, where i is a predetermined positive
8 number;
9 (d) checking whether the processed inter frame is the last one;
10 (e) if it is determined in the step (d) that the processed inter frame is not the
11 last one, selecting the next inter frame and performing the steps (b) through (d);
12 (f) if it is determined in the step (d) that the processed inter frame is the last
13 one, calculating the ratio of the number of inter frames in the i th level to the total
14 number of inter frames in a given region; and
15 (g) determining the ratio obtained in the step (f) as predetermined histogram
16 information.

1 23. The computer readable medium according to claim 22, wherein the
2 digital video processing method further comprises:

- 3 (p-a) receiving video streams;

4 (p-b) grouping the video streams into a plurality of groups using a
5 predetermined algorithm; and

6 (p-c) selecting a group to be processed, and wherein in the step (a), an inter
7 frame is selected from the video stream group selected in the step (p-c).

1 24. The computer readable medium according to claim 23, wherein after
2 the step (g), the digital video processing method further comprises the steps of:

3 (h) checking whether the selected group is the last one;

4 (i) if it is determined in the step (h) that the selected group is not the last one,
5 selecting the next group; and

6 (j) performing the steps (a) through (h) with respect to the next group selected
7 in the step (i).

1 25. The computer readable medium according to claim 23, wherein the
2 predetermined algorithm is a scene cut detection algorithm.

1 26. The computer readable medium according to claim 24, wherein the
2 predetermined algorithm is a scene cut detection algorithm.

1 27. The computer readable medium according to claim 22, wherein the
2 video streams are MPEG-2 video streams.

1 28. The computer readable medium according to claim 23, wherein the
2 video streams are MPEG-2 video streams.

1 29. The computer readable medium according to claim 24, wherein the
2 video streams are MPEG-2 video streams.

1 30. The computer readable medium according to claim 25, wherein the
2 video streams are MPEG-2 video streams.

1 31. The computer readable medium according to claim 26, wherein the
2 video streams are MPEG-2 video streams.

1 32. The computer readable medium according to claim 22, wherein the
2 predetermined histogram information is defined by a region intensity histogram (RIH)
3 which indicates the intensity of a given video scene region.

1 33. A digital video processing apparatus comprising:
2 grouping means for grouping video streams using a predetermined algorithm,
3 selecting a group to be processed, and selecting and outputting each inter frame
4 from the selected group in sequence;
5 ratio calculating means for calculating the ratio of the number of blocks whose
6 motion compensation values are zero to the total number of macroblocks, with
7 respect to the selected inter frame;
8 quantizing means for quantizing the ratio into i levels, where i is a
9 predetermined positive number, and outputting level indication signals which indicate
10 the respective levels; and
11 region intensity histogram (RIH) calculating means for calculating the ratio of
12 the number of inter frames in the i th level to the total number of inter frames in a
13 region, and outputting the calculation result as RIH information.

1 34. The digital video processing apparatus according to claim 33, wherein
2 the predetermined histogram information is defined by a region intensity histogram
3 (RIH) which indicates the intensity of a given video scene region.

1 35. The digital video processing apparatus according to claim 33, further
2 comprising RIH information storage means for receiving the RIH information and
3 storing the same.

1 36. The digital video processing apparatus according to claim 34, further
2 comprising RIH information storage means for receiving the RIH information and
3 storing the same.

1 37. The digital video processing apparatus according to claims 35, wherein
2 the RIH information storage means receives video stream data, interleaves the RIH
3 information into the video stream data and outputs RIH information interleaved video
4 streams.

1 38. The digital video processing apparatus according to claims 36, wherein
2 the RIH information storage means receives video stream data, interleaves the RIH
3 information into the video stream data and outputs RIH information interleaved video
4 streams.

1 39. A digital video analyzing method comprising the step of calculating the
2 difference between RIH_1 and RIH_2 , which is denoted by *Distance* (RIH_1 , RIH_2), as
3 represented by the following Expression:

$$Distance(RIH_1, RIH_2) = (RIH_1 - RIH_2)^T M^{-1} (RIH_1, RIH_2)$$

5 wherein, of two video streams in a given video scene, RIH information of the first
6 video stream is RIH_1 , RIH information of the second video stream is RIH_2 , and M is a
7 covariance matrix.

1 40. The digital video analyzing method according to claim 39, further
2 comprising the step of determining the calculated difference by the difference in
3 intensity between two video streams.

1 41. A method for searching for a desired digital video scene in compressed
2 video streams comprising the step of:

- 3 (a) receiving video streams;
- 4 (b) grouping the video streams into a plurality of groups using a
- 5 predetermined algorithm;
- 6 (c) selecting a group to be processed;
- 7 (d) determining a region intensity histogram (RIH) of the selected group
- 8 based on information on motion compensation of inter frames in the selected group;

9 (e) selecting a video scene to be searched;
10 (f) retrieving RIH information of the selected video scene; and
11 (g) searching regions having similar RIH information based on the retrieved
12 RIH information, in each of the processed video streams.

1 42. An apparatus for searching for a desired digital video scene in
2 compressed video streams comprising:
3 grouping means for grouping input video streams into a plurality of groups
4 using a predetermined algorithm;
5 motion compensation information retrieving means for retrieving information
6 on motion compensation of inter frames from a selected group and outputting
7 processed video streams including the information as the RIH information of the
8 selected group; and
9 searching means for retrieving RIH information of a selected group to be
10 searched and searching for regions having similar RIH information based on the
11 retrieved RIH information.

1 43. A digital video processing apparatus comprising:
2 a grouping unit for grouping video streams using a predetermined algorithm,
3 selecting a group to be processed, and selecting and outputting each inter frame
4 from the selected group in sequence;
5 a ratio calculating unit for calculating the ratio of the number of blocks whose
6 motion compensation values are zero to the total number of macroblocks, with
7 respect to the selected inter frame;
8 a quantizing unit for quantizing the ratio into i levels, where i is a
9 predetermined positive number, and outputting level indication signals which indicate
10 the respective levels; and
11 a region intensity histogram (RIH) calculating unit for calculating the ratio of
12 the number of inter frames in the i th level to the total number of inter frames in a
13 region, and outputting the calculation result as RIH information.

1 44. The digital video processing apparatus according to claim 43, wherein
2 the predetermined histogram information is defined by a region intensity histogram
3 (RIH) which indicates the intensity of a given video scene region.

1 45. The digital video processing apparatus according to claim 43, further
2 comprising a region intensity histogram (RIH) information storage unit for receiving
3 the RIH information and storing the same.

1 46. The digital video processing apparatus according to claim 44, further
2 comprising a region intensity histogram (RIH) information storage unit for receiving
3 the RIH information and storing the same.

1 47. The digital video processing apparatus according to claims 43, wherein
2 the RIH information storage unit receives video stream data, interleaves the RIH
3 information into the video stream data and outputs RIH information interleaved video
4 streams.

1 48. An apparatus for searching for a desired digital video scene in
2 compressed video streams comprising:
3 a grouping unit for grouping input video streams into a plurality of groups
4 using a predetermined algorithm;
5 a motion compensation information retrieving unit for retrieving information on
6 motion compensation of inter frames from a selected group and outputting
7 processed video streams including the information as the RIH information of the
8 selected group; and
9 a searching unit for retrieving RIH information of a selected group to be
10 searched and searching for regions having similar RIH information based on the
11 retrieved RIH information.